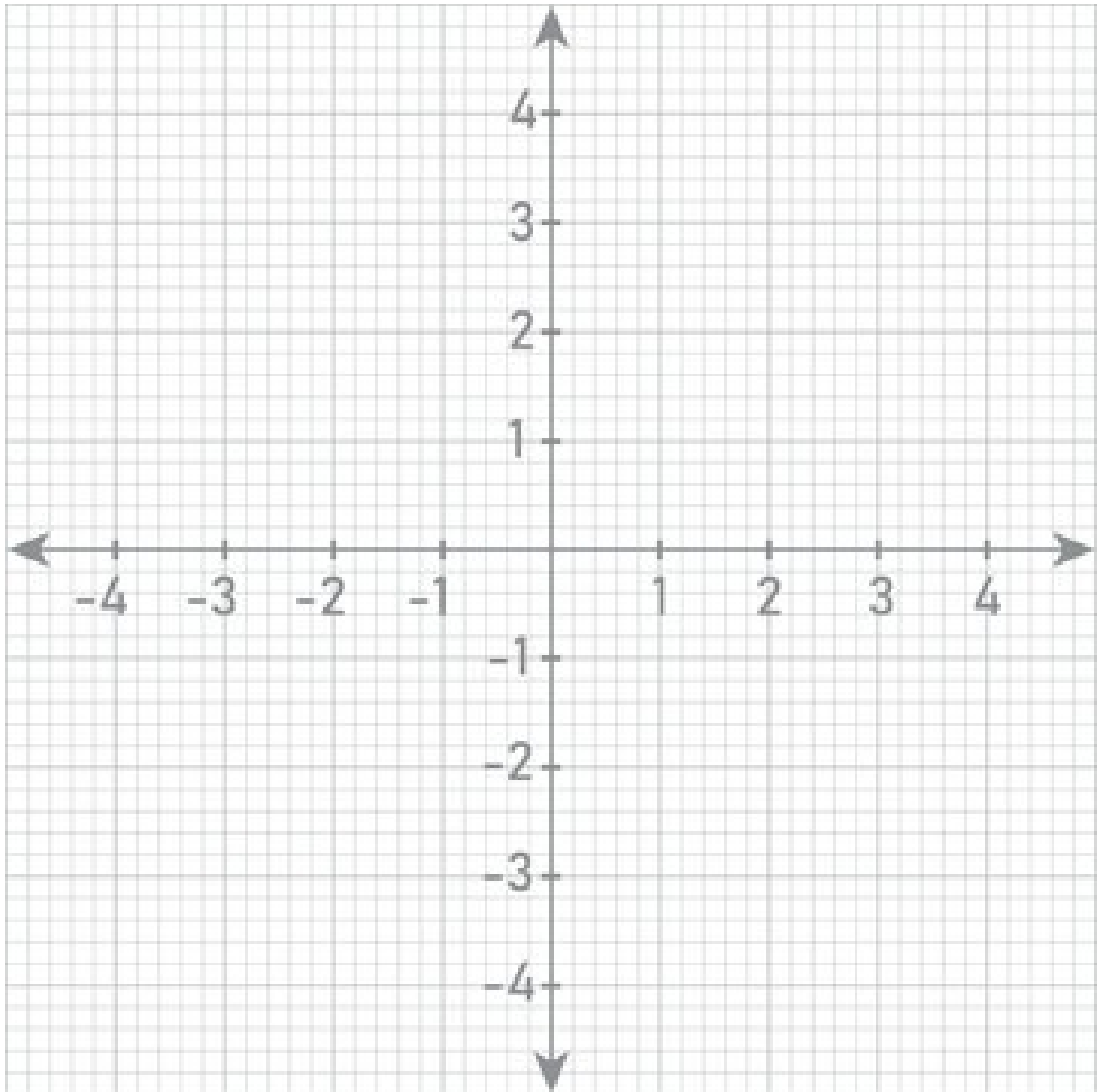


EZEMIDWAYINGA



Ilotshwe nguNhlanhla Xhakumuzi.

Okuqukethwe

1.0 Umugqa

- Asakhe umugqa.
- Umugq' ogatshwe ngezinombholo
- Umugq' oklezile nodendile.

1.1 Umdwayinga

- Amagumbh' omdwayinga
- Izinombholo ezisinxele nezisidle.

1.2 Umana

1.3 Ubude bomugqa

1.4 Unte lomugqa

1.5 Umehlelo

1.6 Izilinganisa zomugqa

Imigqa eqondile

1.0 Umugqa

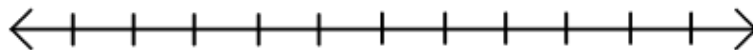
Umugqa ungumdende oqala endaweni thizeni uze uyoma kwenye indawo ngaphandle kokugwegwa. Sithi umugqa uqonde ngqo!

Umugqaa unezinto ezimbhili ezibalulekile, umsuka wawo kanye nomphela:

A ————— B

Isifanekiso soku-1: Umugqa okhombhisa umsuka wawo (Kungaba uhlangothi A noma u-B) kanye nomphetho wawo (Uhlangothi A noma u-B)

Lapho silandelela khona ngokugaba umugqa wethi ngemizaqa, sithola umugqa onje:



Isifanekiso sesi-2 :Umugqa ogatshwe ngemizaqa (Imigqa emincane ehlehlelene ngokulinganayo).

Asenameke izinombholo-ke manje, siqikelele ukuthi unte lwawo sibeka iqanda (0). Kwesokudla sizobeka izinombholo ezisidla (+) kuthi kwisinxele sibeke lezo ezisinxele (-).

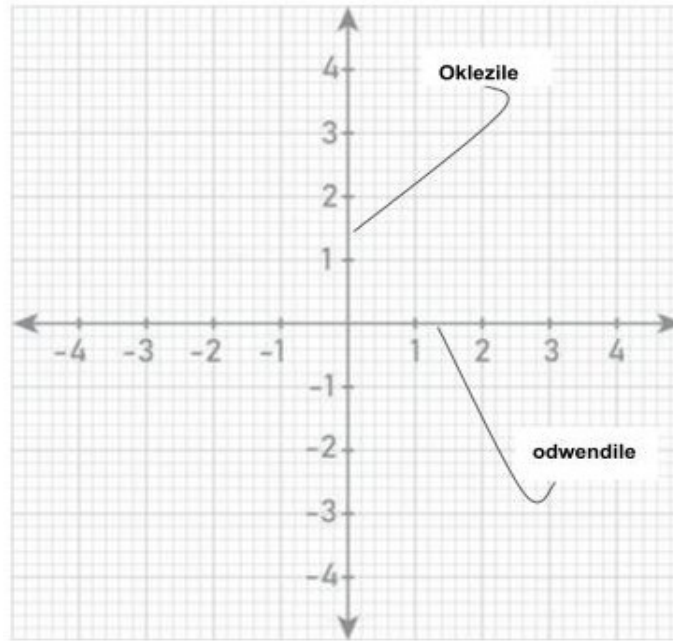


Isifanekiso sesi-3 : Umugqa ogajwe ngemizaqa, kuthi unte lwanamekwa inombholo u-0, kwesokudla kwabekwa izinombholo ezisidla, kwisinxele kwabekwa ezisinxele.

1.1 Umdwayinga

Ake sithathe naw' umugqa siwuklezisa ebese omunye siwudendisa, siqikelele ukuthu lapho iphambhana khona, yakha ingoni eyama-90°. Lapha sikhiqiza **umdwayinga**.

Umdwayinga



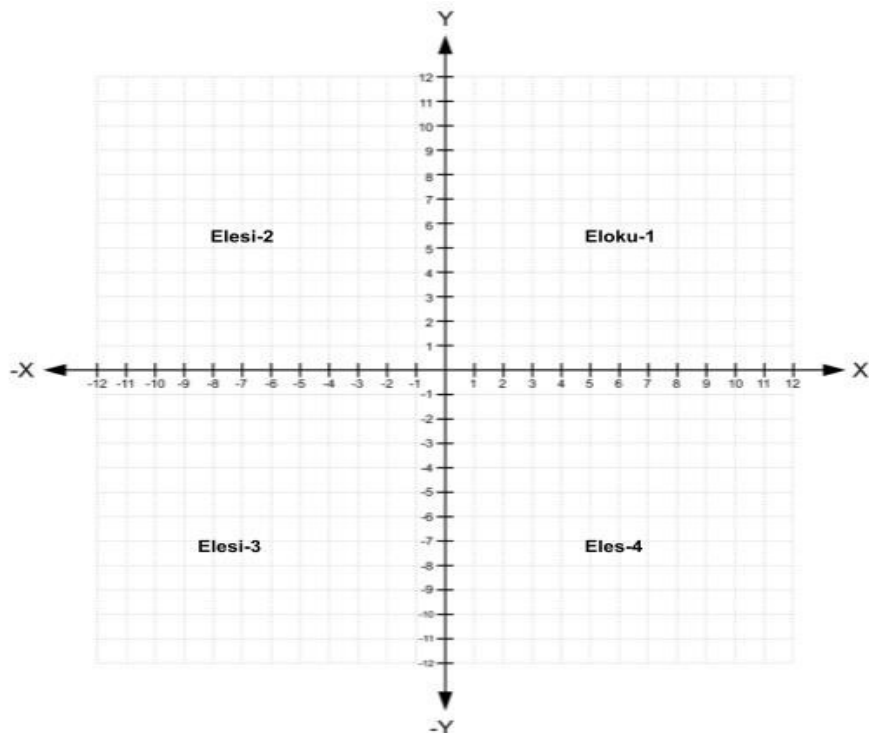
Isifanekiso sesi-4: umdwayinga ukhombhisa imigqa emibli ewakhayo (Oklezile kanye nodwendile).

Asiyiqambhe lemigqa, sithi lona oklezile ungu “y” kuthi lona odwendile sith ungu “x”.

Umdwayinga wethu usuzoba zigabane (izigaba ezi-4):

- 1) Esokuqala ilapho khona u-y kanye no-x beside (+).
- 2) esesibili ilapho khona u-y esidle, kuthi u-x abe sinxele.
- 3) Esesithathu lapho khona u-x kanye no-y besinxele bobabili.
- 4) kuthi esokugcina ilapho khona u-x esidle kuthi u-y abe sinxele.

Lawa **ngamagumbhi omdwayinga**



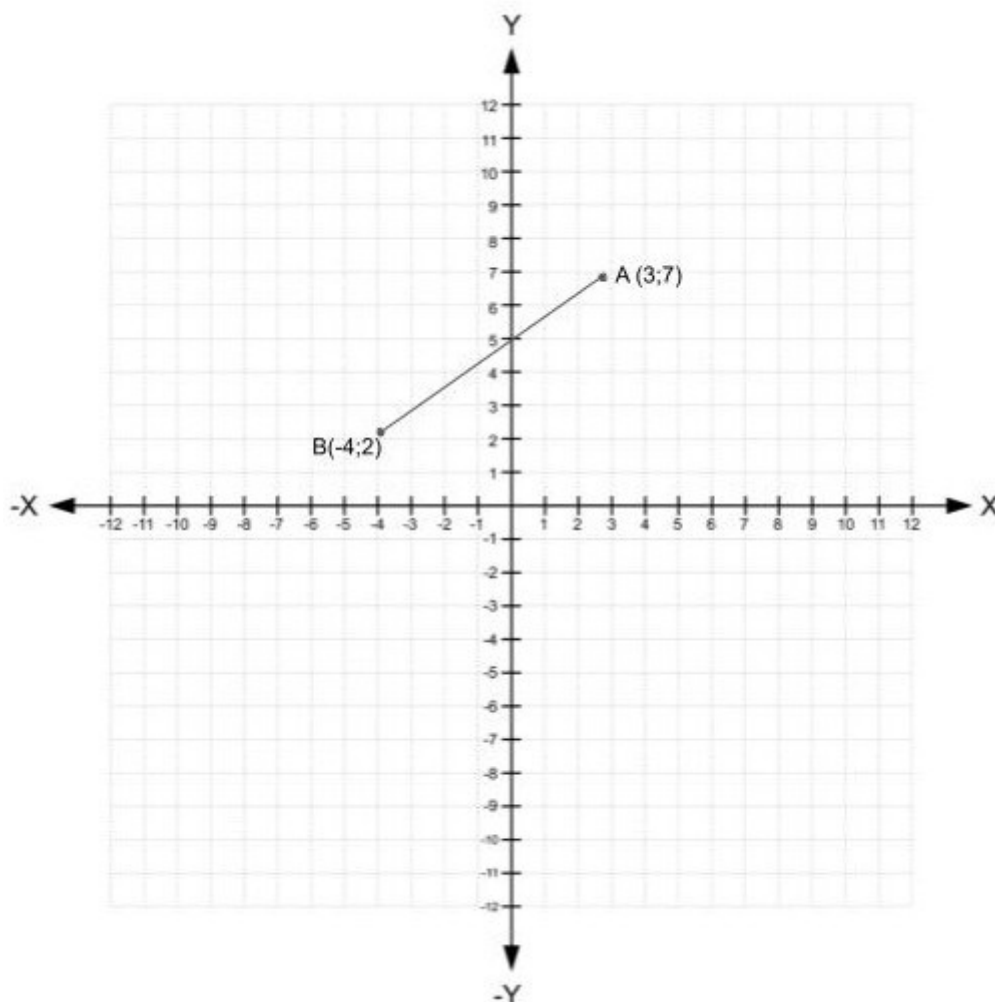
1.2 Umana

Uma sibeka into kunoma iliphi igumbhi, sesingakwazi ukuyabela inkombhabanga esiyiqambhe ngokuthi **imana** eyakhiwe inombholo eqhamuka kumugqa u-x kanye nomugqa u-y; **(x, y)**.

Omana bona bama kanje emagunjini omdwayinga.

- 1) eloku-1: u-x no-y bayizinombholo ezisidle (+) , omana bakhona bazoba u- **(x, y)**.
- 2) elesi-2 : u-x usinxele (-) kuthi u-y usidle (+), omana bakhona bazoba u- **(-x, y)**.
- 3) elesi-3: u-x no-y basinxele (-), omana bakhona bazoba u- **(-x, -y)**.
- 4) elesi-4: u-x usidle (+) u-y usinxele (-), omana bakhona bazoba u- **(x, -y)**.

Uma sithatha omana ababili, singakha umugqa osuka kumana owodwa uhambhe uze uyofinyelele komunye. Noma ikuphi lapho into ikhona kumdwayinga, iyohlala inomana bayo abachaza ubuyona.

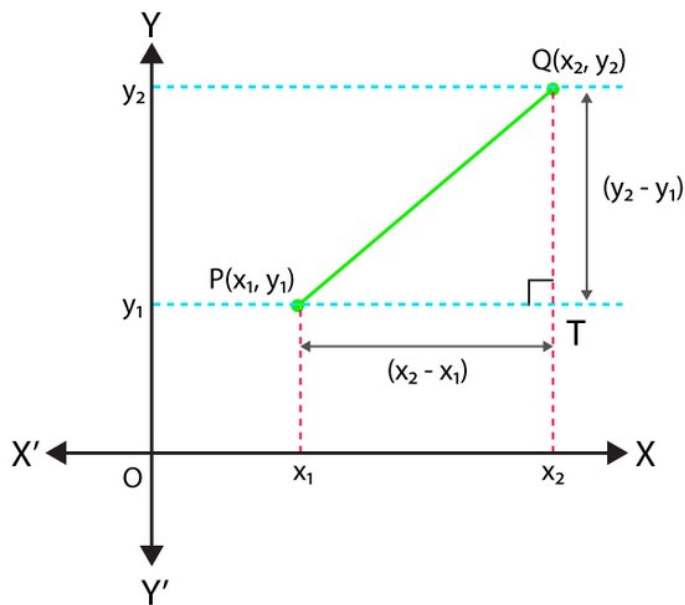


Isifanekiso sesi*6: umugqa osuka ku-A uyophelela ku-B kaney nomana lwawo.

Izinkombhabanga zethu u-A kanye no-B zinomana bazo, bese kuthi uma sidweba umugqa osuka ku-A uyopheza ku-B, sithola umugqa oqondile.

Sesingabuza-ke manje umbuzo obalulekile “ingabe yini esingayazi-ke manje ngomugqa wethu na”.

1.3 Ubude bomugqa



© Byjus.com

Ibanga / noma ubude bomugqa:

Sinomana ababili abahlanganisa umsuka nomphezo womugqa wethu, singabuthola kanjani ubude bomugqa wethu pho?

Sizoqala ngokunombhola omana bethu ngendlela esithanda ngayo, siqikelele nje kuphela ukuthi izinombholo ziyahambhisana:

Sizobiza u- $P(x; y)$ ngo-1, okusho ukuthi omana bakhe bami kanje $P(x_1; y_1)$ kuthi u- Q wona sithi u-2, $Q(x_2; y_2)$.

Ake sibuye nganeno kancane. Uma ngithatha izinombolo ezimbili u-1 kanye no-2, ngifuna ukubona ukuthi eyodwa inkulu kangakanani kunenye, nginasusa leyo encane kwenkulu ngithole $u-2-1=1$.

Ake sibuke lenombholo u-1, njengebanga eliphakathi kuka-1 no-2, sizodinga ukuthi sithole ibanga phakathi komana bethu. Okusho ukuthi sizothola kuqala ibanga phakathi ko- x kanye no- y :

$$(x_2 - x_1) \text{ kanye no } (y_2 - y_1)$$

Lapho sibuka umfanekiso wethu siyabona ukuthi umugqa wethu uma sidweba eminye eqondile, enqamula omana bethu sithola unxantathu. Amabanga esiwathole lapha kwisishikaniso sokuqala aba amabanga omugqa oklekile kanye nomugqa odendile, kuthi umugqa wethu ube uhlangothi lukanxantathu oludlwedlwe.

Ukuthola ibanga lethi sekusithwale kwaze kwasifikisa ezweni lonxantathu.

Okubalulekile okwamanje ukuthi wazi **isibalosiminy** sikaPythagoras, esinikezelwe umzuzano olandelayo:

$$PQ^2 = PT^2 + QT^2$$

U-PT = $x_2 - x_1$ ebese kuthi u QT = $y_2 - y_1$. Uma sifaka uPT kanye noQT kwisishikaniso sethu sithola:

$$PQ^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

Thina sifuna uPQ hhayi uPQ². Uma sisebenzisa isethuli ($\sqrt{x^2} = x$) sithola

$$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \text{ - Isishikaniso sebanga.}$$

Isibonelo 1.0:

Thola ibanga eliphakathi komana u-A(1;3) kanye no B(-4 ; 1).

isixazululo:

1) Qala ngokunombhola omana bakho [A_1 , B_2]
=> $x_1 = 1$, $x_2 = -4$, $y_1 = 3$, $y_2 = 1$.

2) Faka izinombhola kwisishikaniso sebanga:

$$\begin{aligned} PQ &= \sqrt{(-4-1)^2 + (1-3)^2} \\ PQ &= \sqrt{(-5)^2 + (-2)^2} \\ PQ &= \sqrt{25+4} \\ PQ &= \sqrt{29} \end{aligned}$$

1.4 Unte lomugqa.

Sesiyazi ngomana kanye nebanga lomugqa, ake sikhulume manje ngonte (Iphakathi nendawo lomana ababili).

Unte luyindawo enqamula umugqa kabili, ngalendlela yokuthi zombili izinhlangothi zisala zilingana (uhlangothi nohlangothi lusala luwuhhafu lwomugqa oqale ngawo). Kusho ukuthi

$$(x_c = \frac{x_1 + x_2}{2}, y_c = \frac{y_1 + y_2}{2}) \text{ umzuzano wosonte.}$$

Lokhu kusho ukuthi umana lonte kuzoba u- (x_c ; y_c).

Isibonelo:

Thola umana lonte kumugqa osuka ku-A(1;3) uya kuB(-4 ; 1).

Isixazululo:

1)Nombhola umana lwakho [A_1 , B_2]

$$x_1 = 1, x_2 = -4, y_1 = 3, y_2 = 1,$$

2) sebenzisa umzuzano wosente ukuthola umana lonte.

$$(x_c = \frac{1-4}{2}; y_c = \frac{3+1}{2})$$

$$(x_c = -\frac{3}{2}; y_c = \frac{4}{2})$$

$$(-\frac{3}{2}; 2)$$

1.5 Umehlelo

Umugqa kumdwayinga ungama uqode phama, noma wehlele kuhle kwentaba. Thatha umunwe wakho uwubeke ekuqaleni komugqa (kwisinxele) ebese ulandela umugqa uye ngakwesokudla. umehlelo wona ikala ukuthi ngabe umana ku-y luguquguquka kangakanani lapho siluqhathanisa naku-x:

$$M = \frac{y_2 - y_1}{x_2 - x_1}$$

Isibonelo:

Thola inani lomehlelo lomugqa osuka ku-A(1;3) uya kuB(-4 ; 1).

Isixazululo:

1) Qala ngokunombhola omana bakho $[A_1, B_2]$

$$\Rightarrow x_1 = 1, x_2 = -4, y_1 = 3, y_2 = 1.$$

2) Sebenzisaumzuzano womehlelo ukuthola inani lomehlelo.

$$M = \frac{1-3}{-4-1}$$

$$M = \frac{-2}{-5}$$

$$M = \frac{2}{5}$$

1.6 Izilinganisa zomugqa

Lapho sesihlome ngomehlelo, sesingaqhubeka-ke siphendule eminye imibuzo ebalulekile.

Umbuzo : Singasithola kanjani isilinganiso esichaza kahle umugqa wethu na?

Impendulo :

Umugqa wethu siyazi ukuthi uqalaphi uze upgcinephi. Singathatha noma iluphi umana, uma nje likumgama womugqa.

Manje sesigabe ngomehlelo kanye nomana lwethu.

Asithathe isilinganiso somehelo:

$$M = \frac{y_2 - y_1}{x_2 - x_1}$$

$$y_2 - y_1 = M(x_2 - x_1)$$

Lapha sinomana olulodwa nje vo ($x_1; y_1$).

Asiguqule lolu olunye umana silushiye lube u- ($x; y$) nje kuphela.

Isilinganisa sethu sesizoma kanje:

$$y - y_1 = M(x - x_1)$$

Konke osekusele ukuthi sifake umana lwethu esilukhethile, kanye nenani lomehlelo.

Ake sithi sikhethhe u- ($-\frac{13}{5}$; $\frac{8}{5}$).

-Sinomana ($-\frac{13}{5}$; $\frac{8}{5}$)

- Sinomehlelo $M = \frac{2}{5}$

Osekusele ukuthi sifake lez' izinto zethu kwisilinganisi sethu, ebese sisihlela ukuze u-y abe yinhloko yaso.

$$y - \frac{8}{5} = \frac{2}{5} \left(x - \left(-\frac{13}{5} \right) \right)$$

$$y - \frac{8}{5} = \frac{2}{5} \left(x + \frac{13}{5} \right)$$

$$y - \frac{8}{5} = \frac{2}{5}x + \frac{26}{25}$$

$$y = \frac{2}{5}x + \frac{66}{25}$$

okusho ukuthi isona silinganiso sethu lesi esichaza umusho wethu. Uma uthatha umzwi womana, uwufake kules' isilinganiso, uzothola umzwi obhangqwe nawo.

Kwisilingansia sethu, u- $\frac{66}{25}$ ilapho khona umugqa wethu unqamula umugq' oklezile.

Uma sinikwe isilinganisi, singakwazi ukudweba umugqa wethu:

$$y = \frac{2}{5}x + \frac{66}{25}$$

- **Thola unqamuloklezile ngokwenza u-x abe iqanda (0).**

Isizathu sethu ukuthi kumugqa oklezile, lona odendile awukho nhlobo, okusho ukuthi umzwi ohambhisana nawo uba iqanda.

$$y = \frac{2}{5}(0) + \frac{66}{25}$$

$$y = \frac{66}{25}$$

Okusho ukuthi umugqa wethu unqamula lona oklezile kumana u-(0; $\frac{66}{25}$).

Thola unqamulamdende ngokwenza uy abe iqanda (0).

Ngesizathu esifanayo ngenhla, oklezile awukho kodendile.

$$0 = \frac{2}{5}x + \frac{66}{25}$$

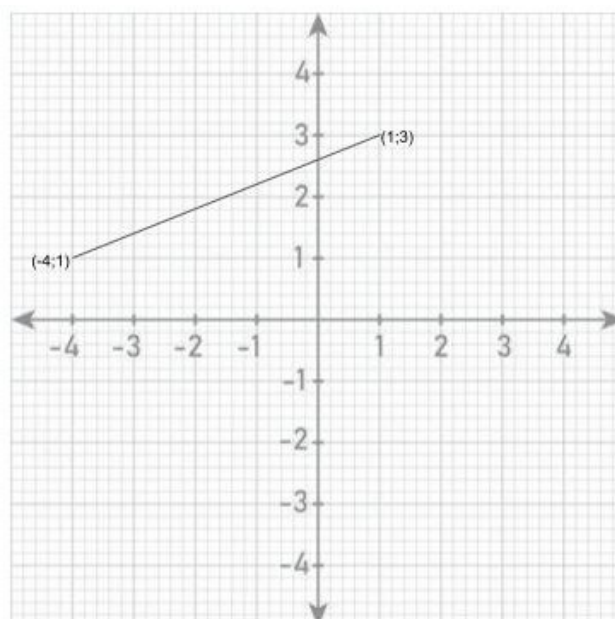
$$-\frac{66}{25} = \frac{2}{5}x$$

$$x = \left(-\frac{66}{25}\right)\left(\frac{2}{5}\right)$$

$$x = -\frac{132}{125}$$

umana lwethu lona luzoba u-($-\frac{132}{125}$;0). Lokhu kusitshela ukuthi umugqa wethi unqamula koklezile lapha ku-(0; $\frac{66}{25}$), uphinde unqamula kodendile lapha ku-($-\frac{132}{125}$;0).

Siyazi futh ukuthi umugqa wethu unomehlo $M = \frac{2}{5} > 0$, okuchaza ukuthi uma usuka kwesesinxele ulandela umugqa lo, uyanyukela.



1.7 Ingoni yomehlelo

Lapho umugqa wethu ungxola, uphinde futhi unqamule umugqa wethu odendile, kwakheka ingoni yengxola. Ubungako balengoni buhambhisana nokuthi ngabe umugqa wethu ungxola kangakanani. Uma umugqa ungxola kakhulu, nengoni yethi nayo iyavuleka ibe nkudlwana.

Ubungxola bomugqa bunikezelwe ngenhla. Siyabona ukuthi u- $(y_2 - y_1)$ uluhlangothi lukanxantathu, kanjalo no $(x_2 - x_1)$. Sinonxantathu onezinhlangothi ezimbhili esizaziyo, sifuna ingoni eyodwa Vo. Kwezonxantathu lokhu kusho ukuthi sizodinga ukusebenzisa isiqhinkqa u-tan.

$$\tan(\theta) = \frac{y_2 - y_1}{x_2 - x_1}$$

Isibonelo:

Thola ingoni yengoxa yomugqa osuka ku-A(1;3) uya kuB(-4 ; 1).

Isixazululo:

1) Qala ngokunombhola omana bakho $[A_1, B_2]$

$$\Rightarrow x_1 = 1, x_2 = -4, y_1 = 3, y_2 = 1.$$

2) Sebenzisa i yengoxa ukuthola ubungoxa bomugqa wethu.

$$M = \frac{y_2 - y_1}{x_2 - x_1}$$

$$M = \frac{1 - 3}{-4 - 1}$$

$$M = \frac{-2}{-5}$$

$$M = \frac{2}{5}$$

3) Sebenzisa i ukuthola ingoni yengoxa.

$$\tan(\theta) = \frac{2}{5}$$

$$\theta = \arctan\left(\frac{2}{5}\right)$$

$$\theta = 21.8^\circ$$

Ngabe konke lokhu kuyahambhisana yini na nalokhu esikubonayo?

Umugqa wethu uyanyukela uma siwubuke usuka kwesokudla uya kwisinxele, okusho ukuthi inani lomehlelo osidle iwona impela esiwulindele.